



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

August 15, 2005

SF-5J

Mr. Thomas B. Ross
Manager, Environmental Remediation
International Paper
6400 Poplar Avenue
Memphis, Tennessee 38197

US EPA RECORDS CENTER REGION 5



Re: Amendments to Operations and Maintenance Plan for St. Regis Paper Company Superfund Site Cass Lake, Minnesota

Dear Mr. Ross:

This letter and attachment will act as notification of certain changes necessary to the extraction system and the monitoring of treated water discharged from the St. Regis Paper Company Site in Cass Lake, Minnesota to the nearby channel connecting Cass Lake to Pike Bay. These changes have been reviewed and approved by U.S. EPA's Agency Partners for the Site.

To date this discharge has been monitored under the terms of an Operation and Maintenance Plan that is part of the U.S. EPA Unilateral Administrative Order to Champion International dated January 24, 1995 ("the Order"). The following monitoring requirement changes modify the current terms of the O&M Plan, including any conditions/standards listed in the expired MPCA permit, which was incorporated by reference into the O&M Plan. These changes are necessary for the following reasons:

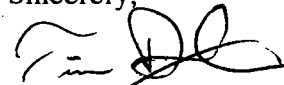
- Two five-year reviews of the Site conducted in 1995 and 2000 recommended that the discharge requirements be modified to reflect current standards and controls applicable to similar discharges. The attached standards/conditions update the current O&M Plan requirements and ensure the operation of the extraction system is consistent with other similar sites as protective of human health/environmental protection and the goals of the two past 5-year reviews.
- Toxicity tests conducted on water samples from the discharge in August of 2003 showed significant toxicity with regard to the growth endpoint of *Pimephales promelas*, indicating possible environmental harm. The required modifications will help to determine more completely whether discharges from the Site may be impacting local species.

- The enclosed capture zone analysis (see Attachment C) of the contaminant plume extraction system reveals that modifications are necessary for the proper operation and monitoring of the system. Please see Attachment B for a list of required changes to the extraction and monitoring system based on the capture zone analysis.

Attached please find modified discharge monitoring standards (Attachment A), a summary of necessary changes to the extraction system monitoring and operation (Attachment B), and a copy of the hydraulic capture zone analysis (Attachment C).

Feel free to call me at (312) 353-4367 if you would like an opportunity to discuss these changes to the operations and maintenance plan of the St. Regis Site.

Sincerely,



Tim Drexler
Remedial Project Manager

Attachments

cc: Shirley Nordrum
Susan Johnson

Attachment A

Requirements for the Discharge of Treated Water from the St. Regis Paper Company Superfund Site to the Pike Bay/Cass Lake Channel, Cass Lake, MN.

International Paper is authorized to discharge from the Cass Lake Carbon Treatment Plant to the receiving water known as the Pike Bay/Cass Lake channel located on Tribal Lands near the City of Cass Lake, Cass County, Minnesota at the following location:

Outfall (previous permit number)
SD 010

Receiving Water PLS Coordinates
NE¼ of the SE¼ Sec. 15, T145N, R31W

Ground water and leachate from the RCRA vault are pumped at an average rate of 170,000 gallons per day and a maximum rate of 288,000 gallons per day. Treated contaminated ground water and leachate are discharged to a narrow channel connecting Pike Bay to Cass Lake. Cass Lake is located between reaches of the Mississippi River.

A. EFFLUENT LIMITATIONS, MONITORING REQUIREMENTS AND SURFACE WATER DISCHARGE RESTRICTIONS

1. The respondent is authorized to discharge from the existing outfall to the Pike Bay/Cass Lake channel (previously designated SD001), subject to the restrictions and effluent limitations set forth herein. "Grab" sample is a single sample or measurement taken at a specific time or over as short a period of time as is feasible.

PARAMETER	EFFLUENT DISCHARGE LIMITATIONS	MONITORING REQUIREMENTS	
		Measurement Frequency	Sample Type
Flow (million gallons per day)	Monthly Ave. 0.200	Daily	Calculated from pumping rate
Diesel Fuel [as Diesel Range Organics (DRO)]	200 µg/L	1x/Month	Grab
Benzene	114 µg/L	1x/Month	Grab
Ethylbenzene	68 µg/L	1x/Month	Grab
Toulene	253 µg/L	1x/Month	Grab
Xylenes (Total)	166 µg/L	1x/Month	Grab
Pentachlorophenol (PCP)	5.5 µg/L	1x/Month	Grab
Benzo (a) pyrene	0.00051 µg/L	1x/Month	Grab
Napthalene	81 µg/L	1x/Month	Grab
Acenaphthene	12 µg/L	1x/Month	Grab

Fluoranthene	20 µg/L	1x/Month	Grab
Phenanthrene	2.1 µg/L	1x/Month	Grab
Anthracene	0.029 µg/L	1x/Month	Grab
Arsenic	53 ug/L	1x/Month	Grab
Chromium as +3	318.1 ug/L	1x/Month	Grab
Chromium as +6	11 ug/L	1x/Month	Grab
Copper	13.6 ug/L	1x/Month	Grab
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.0038	2x/Year	Grab
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.0084	2x/Year	Grab
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.1267	2x/Year	Grab
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.3800	2x/Year	Grab
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxide	0.3800	2x/Year	Grab
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	7.600	2x/Year	Grab
Octachlorodibenzo-p-dioxide	380.0	2x/Year	Grab
2,3,7,8-Tetrachlorodibenzofuran	0.0475	2x/Year	Grab
1,2,3,7,8-Pentachlorodibenzofuran	0.3800	2x/Year	Grab
2,3,4,7,8-Pentachlorodibenzofuran	0.00475	2x/Year	Grab
1,2,3,4,7,8-Hexachlorodibenzofuran	0.475	2x/Year	Grab
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1900	2x/Year	Grab
2,3,4,6,7,8-Hexachlorodibenzofuran	0.0543	2x/Year	Grab
1,2,3,7,8,9-Hexachlorodibenzofuran	0.0633	2x/Year	Grab
1,2,3,4,6,7,8-Heptachlorodibenzofuran	38.00	2x/Year	Grab
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.9500	2x/Year	Grab
Octachlorodibenzofuran	190.0	2x/Year	Grab

2. Samples taken in compliance with the monitoring requirements specified above shall be taken at a point representative of the discharge from the Granular Activated Carbon (GAC) filtration system to the channel. The effluent limitations given above shall not be exceeded at the point of discharge.
3. The discharge shall be limited solely to treated ground water and leachate collected from the RCRA vault located on the St. Regis Paper Company Site, as outlined in the description. There shall be no use of water treatment or chemical additives without prior authorization.
4. There shall be no discharge of floating solids or visible foam in other than trace amounts. The discharge shall not contain oil or other substances in amounts sufficient to create a visible color film on the surface of the receiving waters.
5. There shall be no discharge of toxics in toxic amounts.
6. The respondent shall be responsible for ensuring that the laboratory can achieve a Minimum Detection Level of 5.0 µg/L for Pentachlorophenol. VOCs may be analyzed according to SW846 8260. Diesel Fuel may be analyzed according to the modified Wisconsin method for Diesel Range Organics.

7. Because the limit for benzo(a)pyrene (BAP) is below the detection limits of the currently available analytical technology, discharges will be considered in compliance if test results show no detectable concentration of BAP using GC/MS (method 8270) in SIM mode. The respondent shall report monitoring results below the reporting limit (RL) of a particular instrument as "<" the value of the RL. For example, if the reporting limit method 8270 in SIM mode is 0.010 ug/L and BAP is not detected at a value of 0.010 ug/L or greater, the sampling results shall be reported as "<0.010 ug/L."
8. The respondent shall continue monitoring for the presence of dioxin/furans for at least 18 months and metals for at least twelve months following this operations and maintenance modification. After that time, the respondent can request of U.S. EPA that site operations and maintenance be modified to remove the metals and dioxin/furans monitoring requirement if these contaminants are below the discharge limits in all samples.

B. WELL SAMPLING REQUIREMENTS

1. During the period beginning on the effective date of this document the respondent shall sample wells MW-212, MW-213, MW-220 and MW-2128 as follows:

Parameter	Intervention Limit (all units in pg/L unless other wise specified)	Sampling Frequency	Sampling for all wells unless otherwise specified below
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.0038	2x/Year	
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.0084	2x/Year	
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.1267	2x/Year	
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.3800	2x/Year	
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxide	0.3800	2x/Year	
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	7.600	2x/Year	
Octachlorodibenzo-p-dioxide	380.0	2x/Year	
2,3,7,8-Tetrachlorodibenzofuran	0.0475	2x/Year	
1,2,3,7,8-Pentachlorodibenzofuran	0.3800	2x/Year	
2,3,4,7,8-Pentachlorodibenzofuran	0.00475	2x/Year	
1,2,3,4,7,8-Hexachlorodibenzofuran	0.475	2x/Year	
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1900	2x/Year	
2,3,4,6,7,8-Hexachlorodibenzofuran	0.0543	2x/Year	
1,2,3,7,8,9-Hexachlorodibenzofuran	0.0633	2x/Year	
1,2,3,4,6,7,8-Heptachlorodibenzofuran	38.00	2x/Year	
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.9500	2x/Year	
Octachlorodibenzofuran	190.0	2x/Year	
Diesel Range Organics	200 µg/L	1x/Quarter	
Benzene	114 µg/L	1x/Quarter	

Ethylbenzene	68 µg/L	1x/Quarter	
Toulene	253 µg/L	1x/Quarter	
Xylenes (Total)	166 µg/L	1x/Quarter	
Pentachloralphenol	5.5 µg/L	1x/Quarter	at MW-2128 only
Anthracene	0.035 µg/L	1x/Quarter	at MW-220 only

2. The respondent shall be responsible for ensuring that the laboratory uses Method 8290 for scanning the effluent for Dioxins/Furans. VOCs may be analyzed according to SW846 8260. The respondent shall be responsible for ensuring that the laboratory can achieve a Minimum Detection Level of 5.0 µg/L for Pentachlorophenol.
3. The respondent shall continue monitoring for the presence of DRO and BTEXs for at least twelve months following this operations and maintenance modification. After one year, the respondent can request of U.S. EPA that site operations and maintenance be modified to remove the DRO and BTEXs monitoring requirement of the ground water and/or at station SD 001 if petroleum related contaminants are below the intervention limits in all samples.
4. The respondent shall continue monitoring for the presence of anthracene for at least eighteen months following this operations and maintenance modification. After eighteen months, the respondent can request of U.S. EPA that site operations and maintenance be modified to remove the anthracene monitoring requirement if anthracene is below the intervention limits in all samples.
5. The respondent shall continue Pentachlorophenol (PCP) monitoring for at least eighteen months following this operations and maintenance modification. After eighteen months, the respondent can request of U.S. EPA that site operations and maintenance be modified to remove the PCP monitoring requirement if PCP is below the intervention limits in all samples.
6. The respondent shall continue analyzing the ground water for the presence of dioxins and furans for at least twenty-four months following this operations and maintenance modification. After two years, if all samples are below the intervention limits, the respondents can request of U.S. EPA that site operations and maintenance be modified to remove the dioxins and furans monitoring requirement of the ground water, or alternately establish the intervention limit as a point of discharge effluent limitation at station SD 001.

There shall be no use of water treatment and/or chemical additive(s), without the prior approval of U.S. EPA. The type, amount, and frequency of any treatments and/or additives, if approved by U.S. EPA, will then result in a modification of operations and maintenance. In requesting approval, the respondent shall submit a written request to the Remedial Project Manager (RPM), at least 30 days in advance of the proposed new use or increase. The written request shall include, at a minimum, the following information for each proposed additive:

- a. The commercial and chemical name(s) of the product to be used;
- b. Aquatic toxicity and human health or mammalian toxicity data;
- c. Environmental fate information (including, but not limited to, persistence, half-life, intermediate breakdown products, and bioaccumulation data);
- d. Whether the chemical is a suspected carcinogen, mutagen or teratogen;
- e. The proposed methods, concentrations, and average and maximum rates and frequencies of chemical addition; and
- f. Material safety data sheets, and product labels, including instructions for use.

MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. Representative Sampling

1. Routine and Non-Routine Discharges – SD 001

The respondent shall collect all effluent samples from the effluent stream prior to discharge into the receiving waters. Samples and measurements shall be representative of the volume and nature of the monitored discharge.

In order to ensure that the effluent limits set forth in this document are not violated at times other than when routine samples are taken, the respondent shall collect additional samples at the appropriate outfall whenever any discharge occurs that may reasonably be expected to have pollutant levels which may exceed an effluent or intervention limit contained in this document, as for example, when an unusually large volume of accumulated leachate from the RCRA vault is treated. The samples shall be analyzed in accordance with paragraph C ("Monitoring Procedures"). The respondent shall report all additional monitoring in accordance with paragraph D ("Additional Monitoring by Respondent").

2. Ground Water Sampling Protocol – All MW Stations

Ground water monitoring wells shall be sampled using pumps in accordance with Minnesota Pollution Control Agency, Water Quality Division: Sampling Protocol for Ground Water Monitoring Wells, July 1997, Triplett, et. al. Copies of this publication are available on the internet at <http://www.pca.state.mn.us/water/groundwater/wqsampling.html> or may be obtained from the MPCA by calling (651)296-7162.

B. Reporting of Monitoring Results.

The respondent shall summarize monitoring results in the quarterly progress reports submitted to the RPM, the LLB, and MPCA. The respondent shall submit the results along with the laboratory documents. The respondent shall sign and certify all progress reports in accordance with the requirements of the January 24, 1995 Unilateral Administrative Order. The respondent shall submit legible originals of these documents to the RPM, with copies to LLB and MPCA

C. Monitoring Procedures.

Monitoring must be conducted according to test procedures approved under 40 CFR 136, unless other test procedures have been specified in this document.

D. Additional Monitoring by Respondent.

If the respondent monitors any pollutant more frequently than required by this document, using test procedures approved under 40 CFR 136 or as specified in this document, the respondent shall include the results of this monitoring in the calculation and reporting of the data submitted in the quarterly progress reports. The respondent shall indicate on the quarterly progress report whenever it has performed additional monitoring, and shall explain why it performed such monitoring. Upon request by the U.S. EPA, the respondent shall submit results of any other sampling, regardless of the test method used.

E. Records Contents.

All effluent monitoring records shall bear the handwritten signature of the person who prepared them. In addition, all records of monitoring information shall include:

1. date, exact place, and time of sampling or measurements;
2. names of the individual(s) who performed the sampling or measurements;
3. date(s) analyses were performed;
4. names of the individual(s) who performed the analyses;
5. analytical techniques or methods used; and
6. results of such analyses.

F. Retention of Records.

The Respondent shall retain records of all monitoring information, including, but not limited to, all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this document, copies of quarterly progress reports, and records of all data used to complete the application for this document, in accordance with the January 24, 1995 Unilateral Order.

G. Twenty-four Hour Notice of Noncompliance Reporting

1. The Respondent shall report the following occurrences of noncompliance with regard to the water treatment and discharge system by telephone within 24 hours from the time the Respondent becomes aware of the circumstances:
 - a. any noncompliance that may endanger health or the environment;
 - b. any upset ("upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the Respondent) that results in or contributes to an exceedence of any effluent limitation in the document (See Part V.H., "Upset Conditions"); or

- c. any violation of a maximum daily discharge limitation for any of the pollutants listed in the document. "Daily discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.
"Maximum daily discharge limitation" means the highest allowable "daily discharge."
2. The Respondent shall also provide a written submission within five days of the time that the Respondent becomes aware of any event required to be reported under this document. The written submission shall contain:
 - a. a description of the noncompliance and its cause;
 - b. the period of noncompliance, including exact dates and times;
 - c. the estimated time noncompliance is expected to continue if it has not been corrected;
 - d. steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance; and
 - e. the results of any monitoring data required under Paragraph II.A.1., "Representative Sampling (Routine and Non-Routine Discharges)."
3. Reports shall be submitted to the RPM.

H. Other Noncompliance Reporting.

The Respondent shall report all instances of noncompliance, not required to be reported within 24 hours, at the time that monitoring reports ("Reporting of Monitoring Results") are submitted. The reports shall contain the information listed in "Twenty-four Hour Notice of Noncompliance Reporting".

COMPLIANCE RESPONSIBILITIES

- A. Duty to Comply.** The Respondent shall comply with all conditions of this document. Any noncompliance constitutes a violation of Section XXIII of the Order.
- B. Duty to Mitigate.** The Respondent shall take all reasonable steps to minimize or prevent any discharge in violation of this document that has a reasonable likelihood of adversely affecting human health or the environment.
- C. Proper Operation and Maintenance.** The Respondent shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Respondent to achieve compliance with the conditions of this document. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures approved by U.S. EPA. This provision requires the operation of back-up or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of the document.
- D. Removed Substances.** Solids, sludges, or other pollutants removed in the course of treatment or control of water and wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

E. Bypass of Treatment Facilities

1. Bypass not exceeding limitations. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. "Waste stream" means any non-de minimus stream of pollutants within the respondent's facility that enters any outfall or navigable waters. This includes spills and other unintentional, non-routine or unanticipated discharges. The Respondent may allow any bypass to occur that does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2 and 3 of this Part.
2. Notice.
 - a. Anticipated bypass. If the Respondent knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.
 - b. Unanticipated bypass. The Respondent shall submit notice of an unanticipated bypass as required under "Twenty-four Hour Notice of Noncompliance Reporting".
3. Prohibition of bypass.
 - a. Bypass is prohibited, and the Director may take enforcement action against the Respondent for a bypass, unless:
 - (1) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production;
 - (2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment shall have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance; and
 - (3) The Respondent submitted notices as required under paragraph 2 of this Part.
 - b. U.S. EPA may approve an anticipated bypass, after considering its adverse effects, if U.S. EPA determines that it will meet the three conditions listed above in paragraph 3.a. of this Part.

F. Upset Conditions

1. Effect of an upset. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based effluent limitations if the Respondent meets the requirements of paragraph 2 of this Part.
2. Conditions necessary for a demonstration of upset. To establish the affirmative defense of upset, the Respondent shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

- a. An upset occurred and that the Respondent can identify the cause(s) of the upset;
 - b. The facility was at the time being properly operated;
 - c. The Respondent submitted notice of the upset as required under "Twenty-four Hour Notice of Noncompliance Reporting;" and
 - d. The Respondent complied with any remedial measures required under "Duty to Mitigate."
3. Burden of proof. In any enforcement proceeding, the Respondent seeking to establish the occurrence of an upset has the burden of proof.

G. Planned Changes. The Respondent shall give notice to the RPM as soon as possible of any planned physical alterations or additions to the facility whenever:

1. The alteration or addition to facility may meet one of the criteria for determining whether a facility is a new source as determined in 40 CFR 122.29(b); or
2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in the document, nor to notification requirements under "Changes in Discharge of Toxic Substances".

H. Anticipated Noncompliance. The Respondent shall give advance notice to the RPM of any planned changes in the facility or activity that may result in noncompliance with this document.

Attachment B
Required Changes to Operation and Maintenance Plan for
St. Regis Paper Company Site, Cass Lake, MN.

1. ^{OK} Develop consistently prepared and annotated contour maps of head, estimated hydraulic capture zones, and discussion within Annual Reports. These reports need comparable and more readily understood graphical interpretations of data from year to year. Annual Reports from the past 5 years clearly have used differing methods of preparing head contour maps, but without discussion.
2. ^{OK} More aggressive well redevelopment is needed at OU1 along with continued periodic redevelopment at OU3. Increased pumping to design rates is necessary at OU1, especially at wells 403 and 408. OU1 has not shown the benefit from redevelopment that has been seen at OU3 (in terms of pumping rates).
3. ^{OK} Perform tests of all monitoring wells to identify possible lags in well response to identify possible slow well response rates. This will ensure that no inordinate lags in head measurement data exists. This action is needed to ensure head data are commensurate.
4. In addition to annualized pumping rates, report pumping rates and rainfall rate data on monthly interval in order to provide data to interpret events such as October 2004 loss of capture. Annual Report does not provide sufficient information to determine whether an anomaly is explainable.
5. Add synoptic head monitoring in the Fall for 3 years, with a reevaluation at that time to evaluate seasonality in capture zone performance. OU1 capture zone width and vertical head gradient appear to have a seasonal component, but there are not enough data to evaluate it.
6. Resurvey all monitoring wells to revalidate reference elevations, especially at OU3 and surface water. Benchmark resurveys at OU2 have range of ~0.3 ft. This is enough to significantly change inferred local groundwater flow direction.
7. Investigate and explain occasional apparent mounding near 400, 500, S2400, and S2500 wells to determine whether data do not satisfy data quality objectives or whether data indicate problem with remedy. Some head data imply mounding, which is inconsistent with conceptual model and pumping rate data.
8. Add paired head monitoring wells in upper sand at OU3 in order to confirm no downward gradient. There is only one pair, yet this is the area where upper till is known to be missing in some locations.
9. Add paired head monitoring wells between upper and lower sand at OU3 to confirm no downward gradient. This is an area where upper till is known to be missing in some locations, yet not adequately mapped, and upward gradient must be measured.

10. Add head monitoring wells for upper sand between OU1 and OU3, plus north of OU1 to provide ground-truth to constrain the up-gradient width of interpreted capture zones . This will provide lateral ground-truth for evaluating hydraulic capture zone at OU1 and OU3.
11. Add water quality monitoring well at the base of upper sand at OU3 since only one monitoring well currently exists at base of upper sand. OU1 data show that, except in vicinity of source, monitoring wells identify plume at base of upper sand. Currently only one base-of-upper-aquifer well at OU3.
12. Assess stagnation of down-gradient tPAH concentrations for better understanding of and contingency for tPAH reduction down-gradient of capture zones. After significant reductions of tPAH in first 10+ years of operation, down-gradient offsite monitoring wells are showing tPAH>RAL and no statistically meaningful reduction.